DESCRIPTIVE AND ILLUSTRATED

CATALOGUE,

CONTAINING

Plans in Perspective,

OF

COLLEGES, SCHOOL HOUSES, CHURCHES, AND OTHER BUILDINGS,

AND

SUGGESTIONS RELATIVE TO THEIR CONSTRUCTION, HEATING AND VENTILATION.

By G. P. RANDALL, Architect,
CHICAGO, ILL.

SECOND EDITION—REVISED.

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HORTON & LEONARD, BOOK AND JOB PRINTERS,
104 and 106 Randolph Street.
1866.

COURT HOUSE—G. P. Randall, Architect.

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Entered according to act of Congress, in the year 1866,
By G. P. RANDALL,
In the Clerk's office of the District Court of the United States, for the Northern District of Illinois.

TO THE PUBLIC.

I have prepared this little pamphlet, and send it to my friends and patrons for the purpose of calling their attention to my work, in a form which could not well be done through the ordinary medium of advertising; and also for the purpose of making a few suggestions as to the proper course to be pursued by those about to engage in the construction of buildings.

The views which are here given, are of buildings of my own designing, some of which are built, and others are building and to be built. Should it be asked why I have not given the floor plans, showing the internal arrangement of the several designs herein presented, the reply is that they would be of but little, if any, service to the reader, as they are the property of the architect, with which he does not part, without compensation; and those who use them are liable to him for them, to the same extent as though the plans were ordered of him. I have, therefore, generally omitted their insertion but will send a copy of them to any one who is about to build, and will become responsible for their proper use.

As before intimated, this pamphlet is sent as a medium of advertising; and I will be obliged to any persons into whose hands it may fall, if they will call to it the attention of their friends, who are about to build; and under still greater obligation if they will send me the address of such parties, that I may confer with them direct.

Address,

G. P. RANDALL, *Architect*,

No. 20, Portland Block, Chicago, Illinois.

CHURCH — G. P. Randall, Architect.

THE NECESSITY

OF

HAVING PLANS IN BUILDING,

AND

HOW TO OBTAIN THEM.

As a great proportion of the people outside of the large cities and towns are comparatively unacquainted with building, and especially with the use and value of drawings in the construction of buildings, I propose to suggest some of the advantages arising therefrom, and will also point out the necessary preliminary steps to be taken in employing an architect.

THE USE OF DRAWINGS.

To the educated architect, or business man of intelligence, it would seem like a waste of paper and ink, to attempt to show that buildings cannot be properly built without the aid of carefully made drawings; nevertheless, as there are thousands who have little or no knowledge of their use, I will endeavor to show what some of their advantages are, and the necessity for them.

Before proceeding to do so, however, I desire most emphatically to caution the reader against confounding in his mind the idea of plans, as sometimes made by builders, with architectural drawings made by an architect, who is properly educated in his profession. As well might you employ a nurse to prescribe medicine for you when sick; or a butcher to amputate a limb, should you be so unfortunate as to lose one, as to employ a builder to make plans for your building.

A proper knowledge of the principles of architecture, and the art of building, is only obtained by long years of incessant study, of books which are very rare and difficult to be obtained, which, together with the want of time, places it entirely beyond the reach of the mere practical builder to obtain a tithe of the knowledge of building which a good architect should have, who offers his services to the public as such.

People too often suppose that the making of a "picture" representing a building, is what constitutes a person an architect, but this is an error. There is many a mechanic or builder, who has, as any person may in a few leisure hours, acquired the use of drawing instruments and paint brushes, so as to enable him to draw and color something that will resemble a building; while not one in twenty of such individuals, working in an architect's office all the time for five years, could attain a sufficient knowledge of the business to be able to make a set of drawings for the commonest kind of a building, so that they should be ready for use, without being subjected to the most vigilant scrutiny of the principal of the office.

The requisite qualifications of an architect are, first, to know how to design well, and for this he must have a large endowment of mechanical genius; at least a respectable education, and a thorough knowledge of architecture in its varied styles, as practiced in the different countries where it has flourished in past ages.

His next, and a very essential qualification, is a thorough knowledge of the construction, nature and strength of the materials he has to use, and the numerous and ever varying appliances that may be brought into requisition for meeting and obviating the difficulties thrown in his way to the carrying out of the designs which his genius has conceived. If he be deficient in this respect, though he may design ever so magnificently, his magnificent designs become only the more magnificent failures. Therefore it is, that an architect

should possess a thorough knowledge of this important branch of his profession, for without it he can do nothing.

Again, it should require no demonstration to show that he who is continually designing buildings, for instance churches, colleges, school houses, etc., must of necessity be better qualified to determine all the necessary and multifarious arrangements required, and adapt them to the wants of those who employ him, with a greater degree of success, than he who only designs one. A simple suggestion from a competent architect, is sometimes worth all a set of drawings would cost.

Having, as I trust, convinced the reader that he should, before commencing to build, obtain carefully prepared designs and drawings of his intended building, I will endeavor to point out some of the advantages to be gained by it, beyond that of simply obtaining a good design.

In the first place, no prudent man should think of building, until he knows what he is going to build; and how can he know, until he can see his proposed building and all its parts, delineated on paper? When so delineated, he has an opportunity to examine it as minutely as though the building itself were before him; and before proceeding with the work, can make such modifications in the arrangements, as will bring it to conform to his views; when without such plans, he goes on with the work, as it were, blindfolded, and only sees the defects when it is too late to correct them, except at a heavy expense in extras, which would perhaps, cost him as much as a good set of plans, by the use of which, such extras might have been avoided.

Another and very essential reason why a person should never undertake to build without plans, is, that it is very difficult to build by contract, where you have nothing for a guide as to the manner of doing the work; for a written description of a building can scarcely be made, that may not be differently construed by different individuals, and he who attempts to build thus, places himself entirely at the mercy

of his builder. I will venture the assertion that no person, not even an architect, can describe a building proposed, without plans, sufficiently clear, as that it may not be built for a tenth, if not a twentieth, less than it should cost, and still the builder keep so far within the margin of his contract, as not to make himself liable for a breach of that instrument.

Nothing is more common than to hear an individual remark, after having made one trial at building without plans and specifications, that he will never attempt so foolish a thing again. And why should this not be so? How can it be otherwise than true, that he who devotes his whole time and study to a given subject, must of necessity be acquainted with the subject, to an extent that no other person can be.

HOW SHOULD AN ARCHITECT BE EMPLOYED?

It is sometimes the case, especially in the erection of public buildings, that architects are invited to submit plans in competition. This however, is a pernicious way of obtaining a design, and would never be resorted to were its effects better understood by those seeking to avail themselves of it. In the first place, to enlist the best services and talent of an architect, it must be understood that he will be properly remunerated for such service, for nothing is truer practically, than the lawyer's maxim, "that advice not paid for is of little value," and no man of talent, and in business, will waste the time necessary to make a *good* design, when he stands, perhaps, but one chance in ten, of getting paid for his work. Again, the mere fact of a competition precludes the practicability, not to say possibility, of that free interchange of thought and ideas between the architect and his employer, which is absolutely necessary to a successful accomplishment of the task before him. This difficulty arises from the fact that an individual, or committee of individuals, going from one architect to

another, and continually talking with each, will, however much indisposed he may be to deal unfairly, be continually mentioning leading or available points which he finds in one office, to the principal or his assistants, in another; hence a very serious difficulty in the attainment of the object in view, that of obtaining the best design for the building proposed.

If you would have the combined genius of several architects, or wish to see what they would propose for your intended building, employ them to make *sketches*, at a moderate compensation, with the understanding that if their design shall be approved, they will be employed to complete the plans, and be paid the usual commission for their work.

But there are but few men of ability who will waste their time in a competition; and those who attempt to obtain plans in this way will only enlist the services of young men of limited experience, or broken down practitioners, whose want of ability or integrity has prevented them from securing the confidence of their fellow men to a sufficient extent to place them beyond the necessity of resorting to such means to obtain business. This is the general rule, though there may be honorable exceptions. For similar and other good reasons, if you would secure the best and most competent men as architects, select such as have been long established in their places of business.

Another, and one of the worst features of obtaining designs in a competition, is, that there is so great an inducement held out for the practice of dishonesty on the part of the competitors; and in this, those who expect to be the gainers by obtaining a large amount of gratuitous labor from the architects, are often themselves pretty thoroughly victimized in the operation.

So long as the present organization of humanity exists, it is presumable that men will be found who are willing to resort to any measures however dishonorable, to carry a desired point; and unfortunately architects are not made an

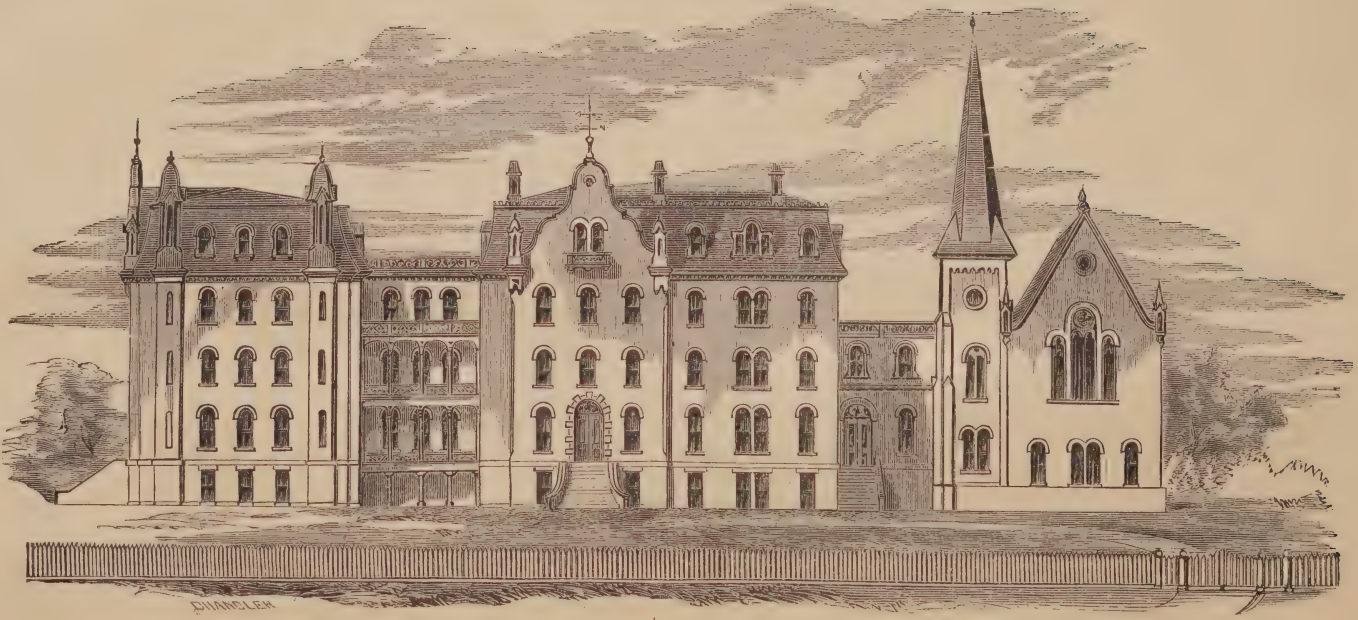
exception to the general rule; hence it is, that in utter disregard of the plainest principles of justice and honor, they will not hesitate to represent that a building may be built from *their* designs for *two-thirds* the amount they positively know they will cost, simply for the purpose of securing "a job," though in doing so they practice the most unwarrantable fraud upon those who are confiding in their integrity, and a shameless disregard of all principles of fair dealing between themselves and their professional brethren. If of rather easy virtue, they may justify themselves by the plea that they are not employed, but only "prospecting," as miners would say, and that it is no breach of faith on their part, that they work for their own interest, and especially, as the other party is endeavoring to obtain from them, their skill and labor without paying for it. Therefore I should say, if you want the services of an architect, employ him, and pay him for his services.

PRELIMINARIES TO ORDERING PLANS.

When plans are ordered by people living in the country, or when the architect cannot see the site of the building, and confer with them in person, there are several matters of importance to be observed. For instance, if the plans wanted are for a school house, be particular to mention the number of pupils to be provided for; and if for a church, state how many sittings will be required.

Always mention of what material the building is to be built, and if there is any doubt as to whether it should be brick, stone, or wood, leave this for the architect's opinion and advice.

He will want to know the position of the lot on which you propose to build, whether it be high or low as compared with the street and the adjacent lots; whether the soil is dry, or if not, whether susceptible of being drained; the nature of the soil; what points of compass the proposed building will front; whether it will have a street on more



PRESBYTERIAN THEOLOGICAL SEMINARY OF THE NORTHWEST.

G. P. Randall, Architect.

than one side, and which side or sides; what part of the building will be most conspicuous from the town and approaches; whether you have good gravel, sand, stone and brick, their nature and color; whether you have *pressed* brick; and it is well to state generally with what facilities these several materials may be obtained, and their cost at the site of the building.

These particularities, to those not acquainted with the business may seem to be unnecessary, but to the architect they are essential, and I might say, absolutely necessary, to enable him to make the best use of the means at his disposal. In giving an order for plans, it is well to make any suggestions that may occur to you as to style of building; if a dwelling house, as to size and number of rooms, and everything that may aid in arriving at the point aimed at, that of making a good design. With all these necessary data in hand, the architect will proceed to make a *design*, which we will suppose to mean the floor plans and elevations of the building, first drawing them in pencil, at which point they may be traced on thin paper, enclosed in an envelope, and sent to the parties for whom they are being made, for his or their inspection and acceptance, rejection or modification, as shall seem to them advisable.

If the design does not in the main meet the wishes of those for whom it is made, another will be made; but if it be generally correct, the employer suggests such modifications as will make it satisfactory, and the plans are then finished, in a proper manner, for practical use. Generally the architect does,—and for all buildings of any importance, he always should,—retain the original specification and *scale* drawings, (plans, sections and elevations,) and if the work goes on, he makes copies of them for the builders, together with full and complete DETAIL DRAWINGS of all the masons' work; cut stone; carpenters' work; iron-smiths' work; and in short, drawings of everything that is to be wrought and worked in the building.

Most people, and especially those who are unacquainted with the business of an architect, have no adequate idea of the amount of labor to be performed, both physical and mental, in making a design and complete set of drawings for a good building. In the first place, it often requires days, weeks, and sometimes even months, of study, in the conception and working out of a design, so as to make it intelligible to others, before a single line of the final drawings shall be made.

Then, every part must be accurately drawn to a scale, each part having a relative proportion to the building when built, and all the principal dimensions calculated mathematically, and figured accurately on the plans.

Next, detail drawings are to be made to an enlarged scale,—and many of them full size,—of every piece of cut stone, iron-work, wooden finishings, framings, etc., and all figured so that they shall correspond one with the other, and each fit its place in the building. Very often these different parts of the work are prepared in places hundreds of miles apart, yet the architect is expected to make his drawings with such an amount of accuracy, that the several parts shall go together almost without the sound of a hammer, as did the work on Solomon's Temple, under the direction of that Grand Architect, Hiram Abif. And reader, when you contemplate the numerous and varied parts and pieces of a building that have to be thus prepared by the architect with such minute accuracy; when you consider that every piece of cut stone in a building in all the numerous parts and pieces of which it is composed,—and sometimes there are many thousand such,—must necessarily be drawn and figured to such a degree of accuracy that there shall not be the variation of an eighth of an inch in any one of them; then, and not till then, can you have a just appreciation of the labor and responsibility, which necessarily attaches to the business of an architect. And this is no fine drawn fancy picture. It is a responsibility which he

CHURCH — G. P. Randall, Architect.

assumes, and which he is under every time he accepts an order to make plans for a building, increasing or decreasing of course with the magnitude of the work in hand. It is sometimes the case that an error of a clerk in misplacing a figure of dimensions of some important part; or of miscalculating, or erroneously figuring, the drawings for a valuable piece of cut stone or other laborious and expensive work, will involve a loss to him of hundreds of dollars. Hence I repeat, that but very few persons have any correct idea of the care required, and responsibility assumed, in working out the design and drawings of a good building.

DRAWINGS MAY BE SENT FOR INSPECTION.

Church Trustees, or Building Committees, and School Directors, or other proper persons who are about to build, will find a material aid in deciding what and how they shall build, by sending me their address, stating as nearly as practicable the nature of the building proposed, when I will send them a variety of designs of similar buildings, which I generally have on hand. Though they may not, and probably will not, be what is required, they will, nevertheless, materially assist in forming a judgment of what may be made. Such drawings will generally be sent by express, and at the expense of the parties ordering them, but with no other expense than express charges, both ways. Those to whom they are sent will see that they be not copied, nor otherwise improperly used.

HOW AND WHEN PLANS SHOULD BE PAID FOR.

Architects are usually paid for their services by a commission on the outlay or cost of the building, and in addition to this, their necessary traveling expenses in going to and from the building in supervising its construction, (if they do this,) and it be outside of the town or city in which they reside.

This commission is the same, or nearly the same, with all first class architects throughout christendom, though on account of local competition it is sometimes varied slightly.

By general agreement the architects of Chicago have a *grade* of commissions for different kinds of work, but uniform as regards the several offices, and all based upon the entire cost of the building. I would here say for the information of those not conversant with these matters, that the cost of making the design and drawings for a building, increases nearly in a uniform ratio with the increase of the cost of the building. I mention this for the reason that there are many people who suppose that the plans for a building costing ten thousand dollars, would cost no more than for one costing one thousand.

In my own practice I charge for work going out of the city, the usual commission, based upon what I would estimate the building to cost if built in Chicago, at the time the drawings were made. This has been, and will be, my practice unless a special agreement shall be made to the contrary; and it is presumed this will be satisfactory as the cost of building in Chicago is generally something less than in the surrounding country.*

On all work whether in city or country, over which I have a supervision of its construction, in whole or in part so that my services shall not be fully paid for until the

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*For *Plain* Wholesale Stores,.....1½ per. cent.
" Ordinary Retail Stores,.....2½ " "
" Dwellings, if Elaborate,.....3 " "
" Dwellings, if Plain,.....2½ " "
" Court Houses, Universities, Colleges, Seminaries, etc....2½ " "
" Public School Buildings,.....2 " "
" Plain Churches,.....2½ " "
" If Elaborate in Detail,.....3 " "

A discount will be made on plans for a block of several stores, dwellings, or other buildings, or on plans for isolated buildings if more than one shall be built from the same designs, all subject to the several conditions recited, as to payments, contracts, etc., on next page.

completion of the building; the commission will be charged for the plans and superintendence, on the entire outlay, extras included.

The cost of making the plans, specifications, and details, complete, is generally about two-thirds, or a little more than two-thirds of the architect's services; in other words, it costs from one-fourth to one half as much to superintend the work, as to make the plans for the building.

It is a more usual practice in supervising the construction of buildings at a distance from the architect's place of business, to visit the work as often as he shall think it necessary, or when called upon to do so, and charge for such service a price agreed upon per diem, together with traveling expenses, instead of a regular commission.

Whatever the arrangement may be, the plans should be paid for when completed, or soon after, for it should be understood that the architect's expenses must necessarily be equivalent to two-thirds or more of his commissions, and therefore he cannot afford to be deprived of the use of his capital invested, for a great length of time.

In my own business, for all ordinary work I expect to be paid for plans on delivery or within thirty days, and if not so paid, I charge interest at the rate of ten per cent. per annum, on all sums unpaid from and after that time; and all orders for work to be done, and agreements in relation thereto, must be understood as having been made at my office in Chicago, and with the above conditions. Plans will be delivered as directed, but in the absence of special direction, they will be delivered to the Express Company in this city, that can carry them to, or nearest to their place of delivery.

MODIFICATION OF PLANS.

Whenever it becomes necessary to make any changes, or modifications of plans, if of much importance, the architect should be consulted in reference to them, for though they

may be laid aside altogether and others used, they cannot legally be materially modified without his consent. He has a right to control them to this extent, nor does he part the right of property in them only for the purpose of constructing the building for which they were made; and if copied or otherwise used, he is entitled to his commission on all work executed from them.

In practice no trouble need ever arise in reference to modifications, should such be desired, for the architect does not care to interfere in such matters only when necessary to prevent the making of such alterations as would disfigure the building, and consequently injure his reputation.

HEATING

AND

VENTILATION OF BUILDINGS.

The subject of heating and ventilating buildings is one not generally very well understood, each individual having, if any, his own peculiar notions and theories, and each of course, more or less imperfect. Having given the subject much thought and consideration in connection with the ventilition of public buildings, and more especially buildings for educational purposes, churches, etc., I propose to make some suggestions relative to the principles on which this should be done, leaving the details as a matter more properly belonging to a specification, than to a mere advertising pamphlet like this.

DE KALB SCHOOL HOUSE—G. P. RANDALL, ARCHITECT.

As heating and ventilating are so intimately connected, it will be necessary to treat the two under one head, or in a measure together. But I will first make some suggestions as to the various kinds of heating apparatus in use, and direct attention to some of their advantages as well as disadvantages.

In the first place, no building can be properly ventilated, that is not properly heated. With this point in view, I will briefly refer to some of the different modes of heating now in use, one of which is by steam and direct radiation; generally by coils of pipe in the room, sometimes around the room next the walls, sometimes under a perforated floor, or within ornamented screens, and otherwise, according to circumstances. With either of these arrangements, the main pipes leading from the boiler should be very large, so as to give an easy circulation of steam, with the boiler under a moderately low pressure. When everything is as it should be, this method is quite sure of giving the necessary amount of heat; but in a school room, church, or public hall, it offers very little aid to ventilation, and only heats the air over and over again, it all the time becoming more and more impure from mixing with the carbonic acid gas thrown off from the lungs. In a modern school room this method is, to my mind, seriously objectionable, for the reason that the pupils sitting next the walls where pipes are distributed, will suffer with the heat, while at other points, they will be made equally uncomfortable by the cold.

In a church, these pipes may be run under each pew, just above the floor, so that the occupants of the pew may sit with their feet directly over the pipes, and in this manner, find great satisfaction in this method of direct radiation. An audience sitting in church, will seldom experience inconvenience from cold, so long as the feet are warm, and as heat generally goes up, and the cold down, it is no easy matter to so completely fill a large room with hot air, as that there will not be a cold zone next the floor. If in

heating by direct radiation, an attempt be made to ventilate by introducing cold air into the room, it will, agreeably to a law of nature, at once find its place next the floor, and hence the occupants must necessarily suffer the discomfort of cold feet. For these and other reasons that might be named, I would never warm a school room, nor any other room that I would have well warmed, and ventilated,—except perhaps a church, as above stated,—by steam pipes and direct radiation.

There is, however, a method by which steam may be used, and these difficulties obviated. This method is, by introducing the steam pipes into a chamber, (generally in the basement of the building,) where the pure air may be heated, and passed to the rooms above, at a comfortable temperature, as is the case with hot air furnaces. There are several ways of transmitting the heat from the steam to the air in the chamber, as for instance through the agency of steam pipes coiled in the chamber, or by cast iron radiators set in the chambers,—a most excellent apparatus, and one which affords a pure atmosphere, not in the least deteriorated by contact with overheated iron,—and other methods, either of which give satisfactory results when properly put up. By these methods a constant flow of pure air is passing through the heating chamber where it is sufficiently warmed, before it goes to the rooms. As this large volume of air flowing into the room, necessitates the displacement of an equal quantity already in, it follows that the air is continually being changed; and if the heating, as well as ventilating apparatus, has sufficient capacity, the air will at all times be in a proper condition for respiration.

Another method of heating, is by hot air furnaces. Of these there are numerous kinds, each having its own peculiar merits and demerits, but when properly set and used, will give good results, and afford the same auxiliary aid to ventilation as do the steam pipes in chambers. Objection is sometimes made that furnaces do not work satisfactorily;

that the air is overheated and bad, but this difficulty almost invariably arises from the ignorance of the person who sets the furnace, or of him who runs it after it has been set.

Of the different furnaces manufactured, some are made for hard, and some for soft coal, and others for wood.

If for any reason either of the above methods of heating the air in chambers before it goes to the room, be objectionable, there is another apparatus which might be called a stove, or it might be called a furnace; in dimensions and general appearance not unlike a large stove, and which may be set in a room, with a cold air duct leading to it from the cellar, or out of doors; the air is heated as it passes through it, and goes into the room warm, as from a furnace or chamber heated by steam pipes. If this apparatus has any advantage over the regular furnace set in a cellar, it is, that at all times it is under the immediate control of the occupants of the room, which might, or might not, be desirable.

In one case, the coal or wood, and ashes, together with the noise and disturbance in tending it, are all in the cellar, while in the other, they are in the school room.

There is another serious objection to the practical working of a hot air stove or furnace sitting in the room, which is, that the vertical column of hot air, which cannot be much if any greater than the height of the furnace, is too inconsiderable to produce a sufficient upward current, and draft of pure air through it and into the room; for it should be understood that the volume so moved, measures the rapidity of change of air in the room, and consequently its ventilation, excepting where a ventilating current can be produced by some mechanical contrivance, acting with the wind, or otherwise.

A common stove is liable to the same objection on the score of dust and noise in the room, and has the additional one of being a direct radiator, and hence liable to the same difficulty as the steam pipes radiating heat directly from their hot surfaces.

Of the relative cost of the different apparatus for heating, the first described is the most expensive, and the others rank in the order in which I have noticed them; but in the quantity of fuel which they will consume, there may not be much difference.

It should be understood that no hot air heating apparatus can be relied on to work properly, if the rooms be not properly ventilated. But I will notice this still further, under the head of

VENTILATION.

The subject of heating and ventilating, is one not generally well understood, and this is especially true of the latter.

In explanation of what I regard as a proper heating apparatus, I have said that the hot air rises to the highest part of the room, while the colder portion settles to the floor.

It does not, as we are accustomed to speak of it, *naturally* rise to the ceiling, for it is just as natural for warm air to go down to the floor, as it is for cold air to do so; but whenever there is in the same room, a portion of the air that is warmer than another portion, that which is warmest, and consequently by a law of nature the lightest, will rise, because it is *forced* to do so by the greater density and weight of the colder air; just as would be the case with two liquids, the one heavier than the other, when, if poured into the same vessel, the heaviest would go to the bottom, and the lighter to the top; whereas, either would *naturally* go to the bottom if unobstructed by the other. These things should be kept in view, if we would understand the true principles of ventilation.

In considering the proper means for ventilating a room, it is absolutely necessary that we should know how it is to be warmed; and the two operations must necessarily be made to work in harmony, for what would be a correct method of ventilating in one case, might be materially defective in another. It might also be the case that an

arrangement of ventilation which would be correct for a room containing but a limited number of persons, would require to be modified for a public hall or church.

There is, perhaps, no kind of a room designed for the use of human beings, that requires a more thorough system of ventilation than a school room; and therefore I will explain the general principles on which such a room should be ventilated.

In designing a school house difficulties frequently arise which prevent the carrying out of the *best* methods of ventilation, one of which difficulties is the want of means to do it, for it must be understood that it cannot be done without more or less expense. Other difficulties, and those most common, are some peculiar combination of rooms, the apparatus for heating, etc. But the general principle is this, that there shall be a constant flow of pure warm air into the room,—a *large* volume *moderately* heated,—and as a natural consequence, an equal quantity of air flowing out of it, generally more or less vitiated, by an admixture of foul air, exhaled from the lungs. For the usual purposes of warming, it matters not whether the warm air is admitted to the room through the floor, at or near the floor in the walls, or near the ceiling; but on account of convenience, or the mechanical construction of the apparatus, it is sometimes best one way, and sometimes another. If it enters at the floor, it at once goes to the ceiling, and does no more than this if conducted there in a pipe, before it is let into the room, For ordinary ventilation the air should be exhausted from the room by the ventilator, through an outlet or openings in the floor, or in the wall close to the floor. This is very important; for as the warm air from the furnace is continually flowing in and filling the upper portion of the room; the cold, or coldest air, which is at the floor, should be drawn out by the ventilator, and give place to the zone of warm air, which is thus permitted to settle down from the upper to the lower part of the room. Every room of this

character should also be provided with a ventilator, near, or in the ceiling, for the purpose of drawing off the warm air, if it should be found to have reached a temperature too high, or to have become too much contaminated, for healthful respiration.

The carbonic acid gas exhaled from the lungs, in a cooled state, is heavier than the common air which we breathe, and hence settles to the floor; but when in a rarified state as thrown off from the lungs, it mixes with the warm air, and in a room long crowded with people, and not thoroughly ventilated, the air will become exceedingly foul, and unfit for breathing. Any persons may satisfy themselves of the correctness of this theory, by taking a seat in a high gallery in some of our badly ventilated churches or public halls, or by placing themselves where their heads will be near the ceiling, even in a smaller and less crowded room.

For these and other reasons, it is well to provide ample ventilation in or near the ceilings of large public rooms.

Of the different methods of disposing of the foul air after it has been taken out of the room, I will only say in general terms, that the best and most effectual manner, is to take the air from each room, *down* to the cellar or basement; and there gather it to a single ventilating shaft, through which it may pass up and out of the building. I have said that this is the best method, everything else being favorable; but this must depend on the kind of heating apparatus used, and the appliances that can be brought to bear to produce a thorough exhaustive power in the main or ventilating shaft; for without this power, other methods might be more desirable. A vertical column of hot air passing from the furnace to a room above, has a moving power equal to the difference between its weight, and that of an equal volume of cold air outside the building. Therefore, without any exhaustive power in the ventilator, a column of hot air from the furnace will, by its

greater rarification, be forced into the room, by the overbalancing weight of the outside atmosphere, and of course displace or drive out an equal bulk of air in the room. This being the case, it will readily be seen that a large advantage is gained in ventilation, by having the heating apparatus in the cellar.

But a properly arranged system of ventilation should have the coöperative aid of a well constructed heating apparatus, and *vice versa.* When so arranged, the waste heat from the fire and smoke thrown off from the furnaces or other heating apparatus used, may be made instrumental in thoroughly ventilating the building. As a general rule, the means used for this purpose in winter, are not at hand in summer, and for the reason that fires are not generally kept burning during the warm season. This exhausting current in the main shaft may, however, be kept active in summer, and greatly accelerated in winter, by the aid of various mechanical contrivances, and the action of the wind. But for summer ventilation there is, perhaps, no better method than by opening the windows and doors. With a perfect system of heating and ventilation, there should be no necessity for opening windows in the winter season; and no building, especially a school or dwelling house, is properly warmed, that does not have its corridors and halls warmed also. With a cold atmosphere in the halls, always ready to rush in and diffuse itself over the floor at every opening of a door, it is impossible to keep the feet warmed to a degree approaching comfort.

For a similar reason no person can sit under, or near a window in a cold day, however close the sashes may be fitted, and not experience inconvenience from cold feet, and cold currents about the head. This arises not from leakage of air through the window sashes; but from the process of cooling, which is rapidly going on, at and near the surface of the glass, whereby the air thus suddenly cooled, sinks rapidly towards that lower level, which is its relative normal

position; and thus creating a circulation of air in the room, which is often mistaken for a current supposed to be coming in at some leaky door or window. To obviate this difficulty, and have a house comfortably and economically warmed, the windows, in the cold season, should always be doubled. Those who have never experienced their advantages, can hardly realize how much of comfort and economy may be gained from their use. They may be arranged so as to ventilate through them if desirable, and at the same time completely and effectually shut off the cold, and prevent those unbidden currents, the evil effects of which I have endeavored to point out, and their remedy.

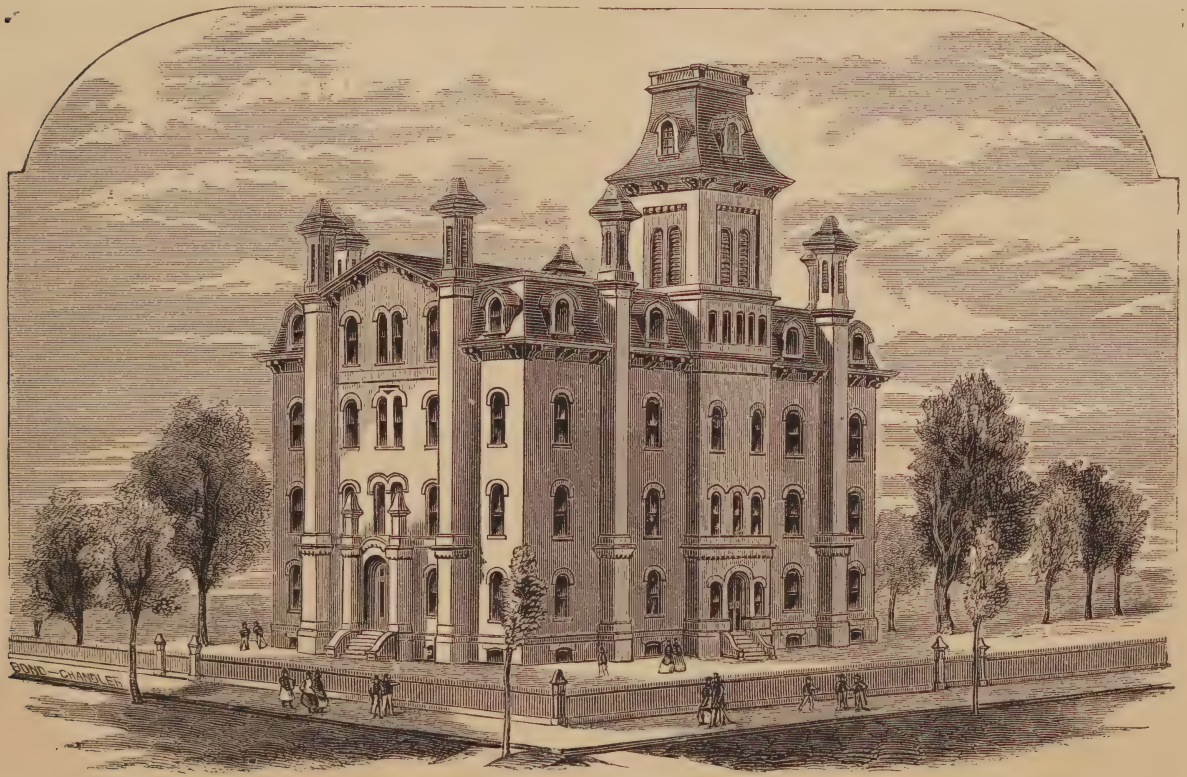
A volume might be written upon the science of heating and ventilating, but space will not admit of further extension of the subject in this place.

In making designs for buildings which require thorough ventilation, the subject will have its full share of attention, and all the peculiarities of the apparatus in each particular case, fully exemplified and shown in detail.

SCHOOL HOUSES.

On the opposite and other pages, I have given perspective views, of several school houses; and on one page, two floor plans for cheap country houses; the latter, mainly for the purpose of showing the usual method of arranging the seats.

For several years past, I have given special attention to the designing of public school buildings; and my efforts in this direction have been attended with such unbounded



AURORA SCHOOL HOUSE—G. P. Randall, Architect.

SYCAMORE SCHOOL HOUSE — G. P. Randall, Architect.

success, that during the past year, there has scarcely been a day when I have not had from one to half a dozen designs for such buildings, on my tables; and I am now constantly receiving orders, not only from School Boards in this, but the surrounding States.

The unprecedented number of these buildings which I have designed, seemingly in almost every conceivable form, and varying in capacity, from fifty to fifteen hundred sittings; and in cost, from a few hundreds, to fifty and sixty thousand dollars; and having generally retained the original drawings, I now find myself in possession of a very valuable collection of such designs, which School Boards, or individuals, may obtain for inspection, in the manner explained elsewhere.

The view of the school house at Sycamore, in this State, represents a building having three stories available for school rooms; there being four rooms in the first, four in the second, and two in the attic story; and in the latter, a large hall for general exercises of the school, when together.

Each room is for sixty-four scholars, at double desks; consequently the ten rooms will seat six hundred and forty pupils. The building is thoroughly built of wood, with brick foundation; and cost the small sum of $14,000. Its cost at the present time would be considerably greater.

The view of the school house at Aurora, shows a building of fourteen school rooms and a hall, and fitted with all the modern improvements, including a correct system of ventilation; and is to be seated with single desks. When completed, it will be second to none in this part of the country.

I have others in process of construction and not much inferior to it, at Litchfield, Olney, Jacksonville, and other points in this State; and at Winona, Minnesota; Berlin, Wisconsin; and elsewhere in adjacent States.

The view of the building at Berlin, is for a house with three school rooms on a floor, each for sixty-four scholars at

single desks, making the capacity of the building about four hundred sittings, exclusive of the hall. It is a very perfect design, especially in its arrangements for heating and ventilating.

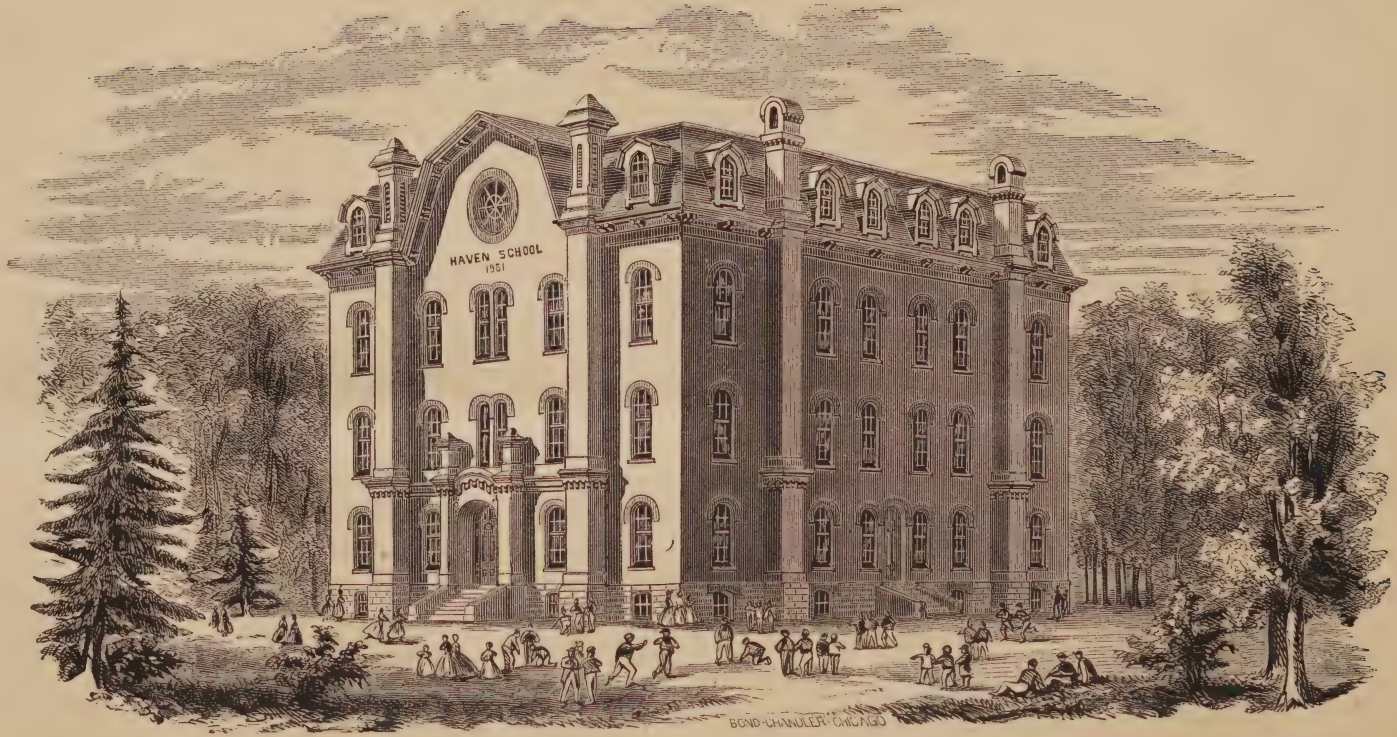
On another page, is a view of a school house at DeKalb, in this State, which is built of brick; has two rooms in each story, and a hall in the attic. Each of the school rooms will seat about sixty-five to seventy scholars, and consequently its capacity is for from two hundred and sixty to three hundred pupils, depending upon the manner of seating; and this, too, exclusive of the hall, which may be used as a school room, and seat about one hundred and fifty more. It will be understood that besides the principal rooms, there are all necessary cloak rooms, recitation rooms, etc. This building may readily be enlarged, by a wing in the rear, increasing its capacity one-half of what it is at present; and this may be done in the construction of the original building, or at another time. Since originally built at DeKalb, its interior arrangements have been materially modified. It should cost at the present time about $15,000.

On another page are two floor plans for country school houses, which I have given mainly for the purpose of showing the general arrangements of seats and desks; that of No. 1 being furnished with double desks, and combination seats; while that of No. 2 has single desks and seats. In No. 1, A and B are boys' and girls' wardrobes respectively; C, vestibule; D, school room; E, coal room; F, teacher's closet; and G, teacher's platform. In No. 2, A, B, C, D, and G, have the same reference as in No. 1; H, being a teacher's closet; E, book and apparatus room; and F, a recitation room. This room is arranged for a principal and an assistant.

PUBLIC SCHOOLS.

For this city, I have designed the Newberry and Skinner school houses, each having seats for about fourteen hundred

SCHOOL HOUSE, BERLIN, WIS.—G. P. Randall, Architect.



HAVEN SCHOOL, CHICAGO—G. P. Randall, Architect.

pupils; the Haven, which will seat one thousand; and branches to five of the other main schools, which will seat nearly four hundred pupils each.

Though very well arranged internally, and neatly and substantially finished, they are, for reasons entirely beyond my control, but very imperfectly heated and ventilated; indeed, in this respect they are far behind scores of them which I have designed, and are being built in this and the surrounding States. Even in "Egypt,"—benighted Egypt,—there is rising many a school building, which for completeness in their heating and ventilating arrangements, no less than in their external appearance, architecturally considered, are materially in advance of the best in this city.

There are at present, in process of construction from my designs:

One at Aurora, Illinois, to cost about		$50,000
" Galesburg,	" " "	33,000
" Litchfield,	" " "	26,000
" Du Quoin,	" " "	20,000
" Jacksonville,	" " "	25,000
" Macomb,	" " "	20,000
" Laporte, Indiana,	" "	40,000
" Red Wing, Minnesota,	"	20,000

and many others.

The above includes only such as cost $20,000, and over. By far the greater number for which I make designs, range in cost, from $6,000 to $15,000, but space will not permit me to enumerate them here. Of such is the elegant house at Sycamore, Illinois; one at Pekin; others at DeKalb, Mount Carroll, Mattoon, Elmwood, and elsewhere in this State, and a large number in the surrounding States.

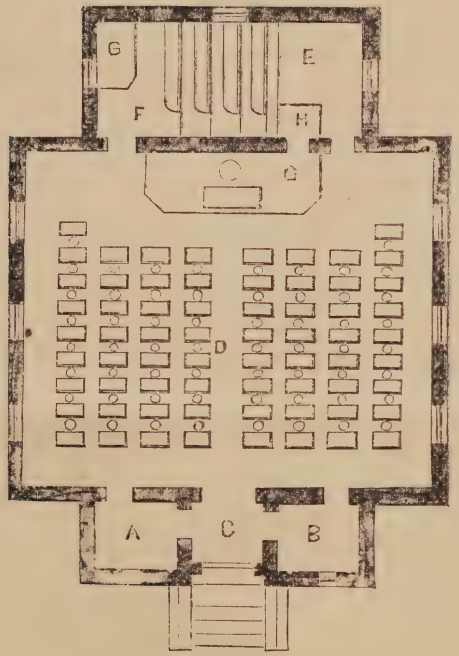
Of a still cheaper class, I design a great many for the country with only a single room; others with two, three, and a greater number of rooms; some with one, others with two and three stories in height, and varied in their general arrangements so as to accommodate almost any given number of pupils required, and often so arranged that an enlargement by a wing, may be made at any future time.

As a general rule, I do not think it advisable to make these buildings very elaborate in design. They usually are, or should be, located on large lots, and often at considerable distance from the street; and nothing more is necessary by way of ornamentation, than to give them a good outline, sometimes, perhaps, relieved by a tower, ventilating shaft or chimney; either of which can generally be made useful, as well as ornamental. The absence of ornament does not necessarily imply poverty of design; but misplaced ornament often mars what would otherwise be a creditable production. The interior should have commodious and well ventilated school rooms; corridors of ample dimensions, with easy stairways; wardrobes, or cloak boxes, for each school room, and other necessary appendages, all neatly fitted up, but thoroughly plain; and if so fitted and furnished with modern furniture, it will materially aid in cultivating in the pupils, a habit of taking care of, and preserving, rather than of destroying, the building and its appendages.

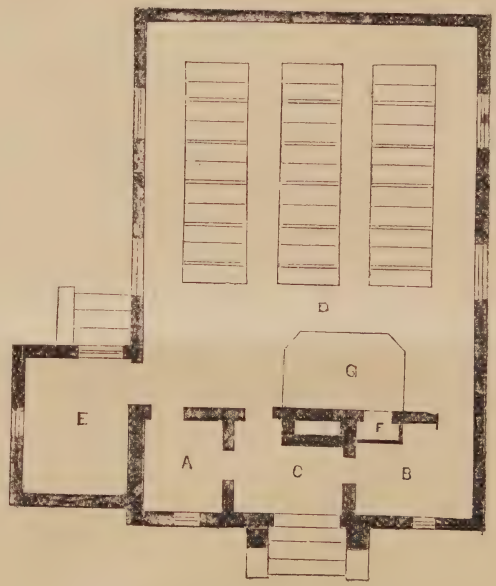
ARRANGEMENT OF SCHOOL ROOMS.

Before closing this article on school houses, it might be well that I should make some suggestions relative to the arrangement of school rooms.

It is now pretty generally admitted by practical educators, that a single room large enough to seat from fifty to sixty-five scholars, and exclusively under the supervision and instruction of a single teacher, is better than a larger room, with recitation rooms and assistant teachers. I make designs for them both ways, but probably not more than one in fifteen, with the large room and recitation rooms attached. As I am generally instructed in this matter, it follows that teachers are almost unanimous in the opinion that the single room system is the best; and it is the system adopted by the School Board of Chicago, in the public schools of this city.



No. 1.



No. 2.

PLANS FOR PUBLIC SCHOOL HOUSES — G. P. Randall, Architect.

NORTHWESTERN UNIVERSITY, EVANSTON, ILL.

G. P. Randall, Architect.

UNIVERSITIES, COLLEGES,

AND

SEMINARIES.

Besides public school buildings, I have had a liberal share of patronage from the Guardians of these institutions of learning. I am, at the present writing, making drawings for the NORTHWESTERN UNIVERSITY, a building which is soon to be erected at Evanston, in this State, under the guardianship of the Methodist Church of the Northwest. It is expected that it will be built of stone, and when completed, will take rank with the best buildings of its kind, in this part of the country.

Below are the names of some of the buildings of a collegiate character, for which I have made designs since a resident of Chicago:

The STATE NORMAL UNIVERSITY at Bloomington, (now called "Normal,") at a cost of about $175,000.

The PRESBYTERIAN THEOLOGICAL SEMINARY OF THE NORTHWEST, two designs, last one finally built from, in part; will cost when completed, say, $100,000.

METROPOLIS COLLEGE, not yet built; probable cost, $40,000.

The UNIVERSITY OF ST. MARY OF THE LAKE, (Catholic,) one wing built; probable cost when complete, $80,000.

Besides the above, mention might be made of several seminary buildings, not of a magnitude to take rank with buildings of a collegiate character.

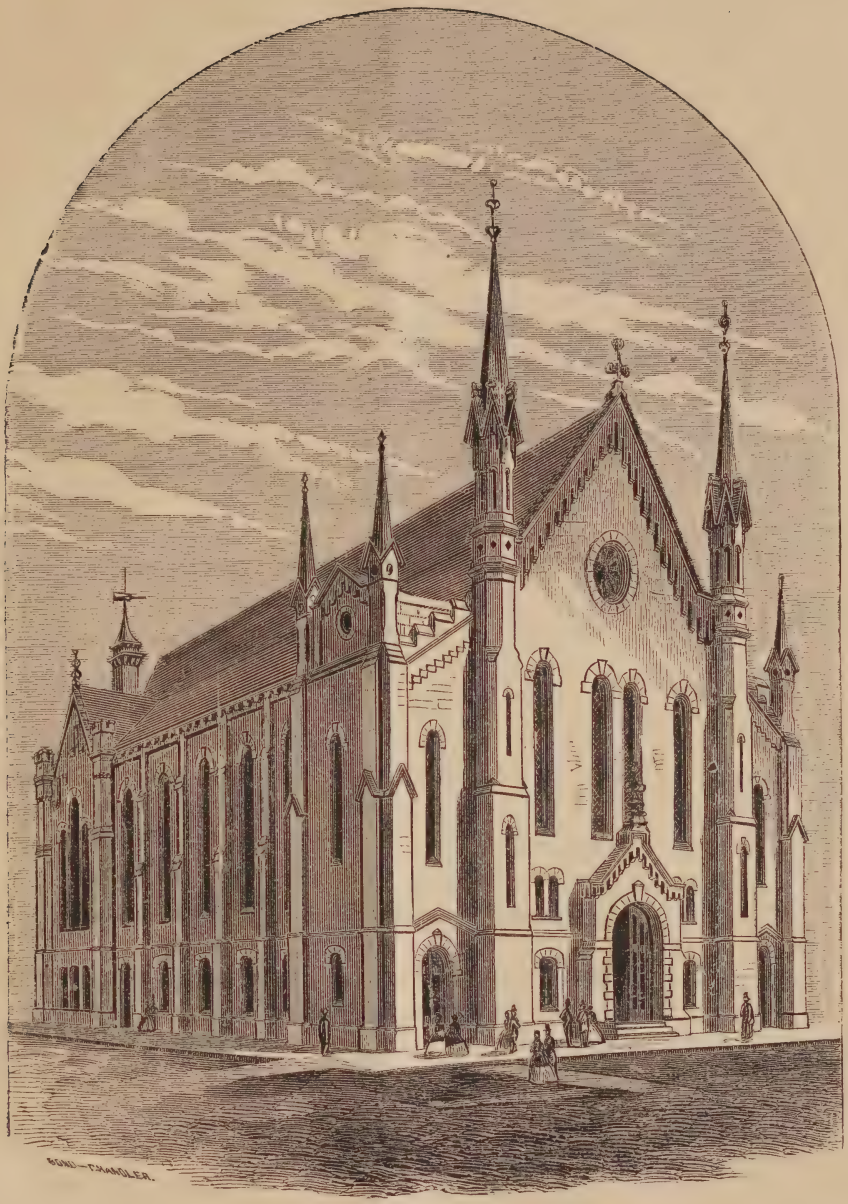
CHURCHES.

Next to buildings for educational purposes, I devote a liberal share of attention to the designing of houses for public worship.

I have designed, this present year, and have in process of construction, an unusually large number of churches; varying in cost from eight, to seventy-five thousand dollars. One of the largest and best of these, is Plymouth Congregational Church, on Wabash Avenue, in this city. It is a building some 70 by 115 feet, with stone fronts on two streets, (the lot is on a corner,) and will seat about one thousand people. When completed, it will be one of the best churches in the city. Besides this, I have several others in the city, now building and to be built; and still others elsewhere, in this and adjacent States.

I have given several designs for churches, and may add others at some future time. One of them, for a building having a clere-story and transept, is adapted to the wants of a very large congregation, and one where architectural effect is to be studied, as well as how to build a church worth forty thousand dollars, when but twenty-five thousand have been provided with which to do it. Another design is for a neat, small, stone church, suitable for a small country or suburban congregation, and still another somewhat larger, though of comparatively moderate expense, to be built of wood.

These are but a small number out of a great variety of designs which I have, of buildings suitable for city or country, and it should be understood, reader, that these designs were not made for *you*, and hence may not suit you, though they were entirely satisfactory to the parties for



PLYMOUTH CONGREGATIONAL CHURCH, CHICAGO.

G. P. Randall, Architect.

M. E. CHURCH, SYCAMORE, ILL. — G. P. Randall, Architect.

whom they were made. It is a fact not generally understood except by architects; that a design made for an individual or committee of individuals, will seldom be what another individual or committee of individuals would select for their use. Hence it is, that each congregation must always have a design made to meet its particular case and circumstances; and though this may seem strange, it is nevertheless true; and a plenty of good reasons may be given, for what at first seems so paradoxical.

To parties who propose to build in the country, and desire to build a good looking building with a moderate expense, (and all do,) I should say, build of wood. Eight or ten thousand dollars will build for a congregation of moderate size, a neat and tasteful building, if properly designed; whereas the same amount of money expended in a brick building, would make but a poor, distasteful production. One important reason for this, is the fact that much may be done in the way of beautifying a frame building, by painting in colors, that is wholly lost in brick. If, however, your building is to cost twenty or thirty thousand dollars, and you have a good quality of brick, of good color, and good stone for dressing, then the case becomes different. In such case I should advise that brick be used.

But the best material for a church, be it great or small, is stone; providing, always, that the building be correctly designed. It matters little how plain the building, or how rough the stone, if the design be properly treated.

In determining the style in which, or the material of which, a church should be built, it is always better to give the architect a minute statement of the different materials at hand, their quality, the color of stone or brick; and then consult him as to the material to be employed. That there is an "eternal fitness of things," is a maxim of general acceptation; and its application, through the genius of Ictinus, gave Athens its Parthenon from the quarries of Mount Pentelicus; which doubtless would have been another and

quite a different building, had it been built from and of, the cedars of Lebanon. Therefore, I should say that a building should be designed with special reference to the material to be used, and so as to make the best use of the means provided.

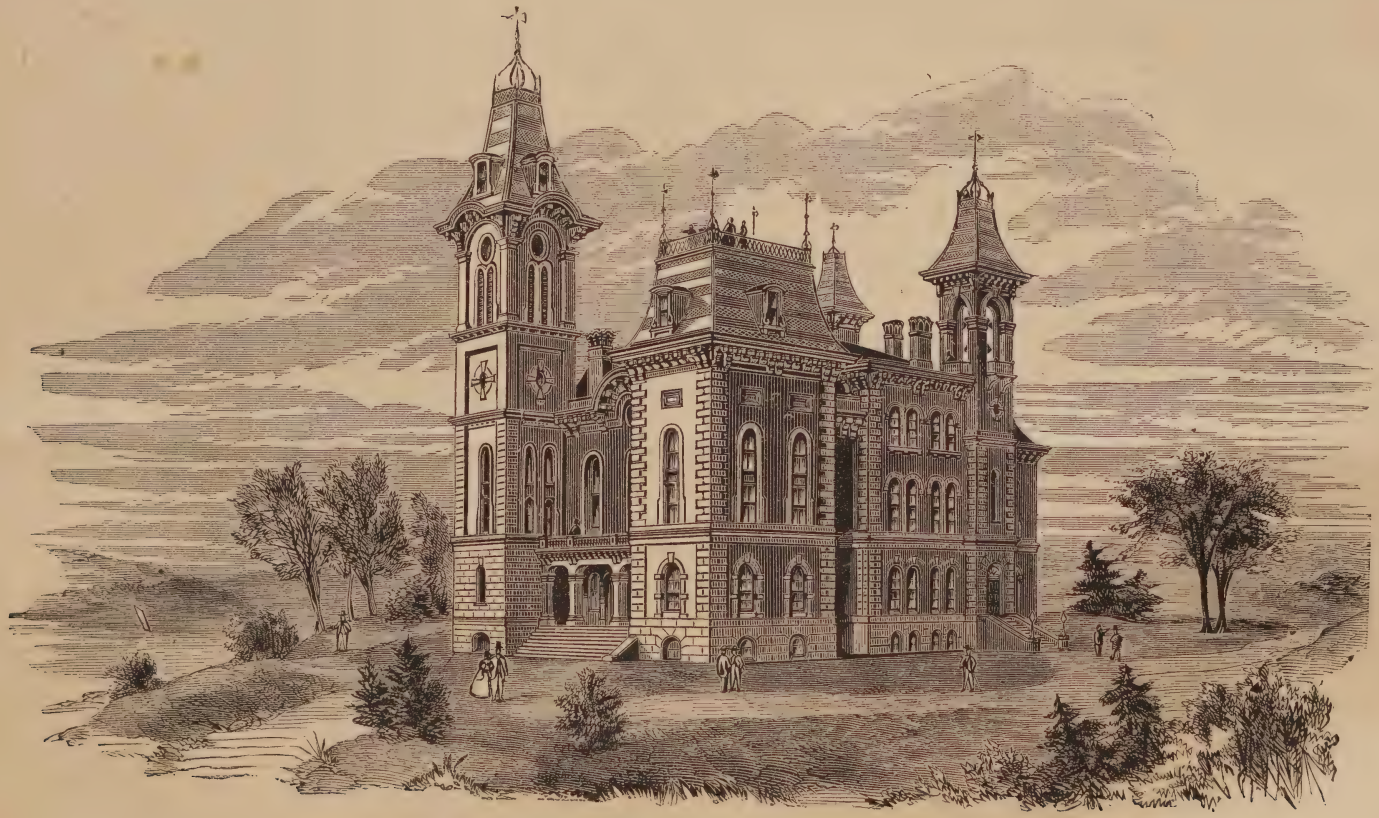
COURT HOUSES.

Of court house designs, I have a great variety, in different styles, and with various combinations of rooms; some of which are arranged for county offices alone; and others for county and city offices in the same building. Then, again, some are arranged for a jail in the basement, while others are not. Objection is sometimes made to a jail so situated, on account of the bad atmosphere therein generated; but if it be thoroughly and properly ventilated, there should be no bad air in it, or comparatively none.

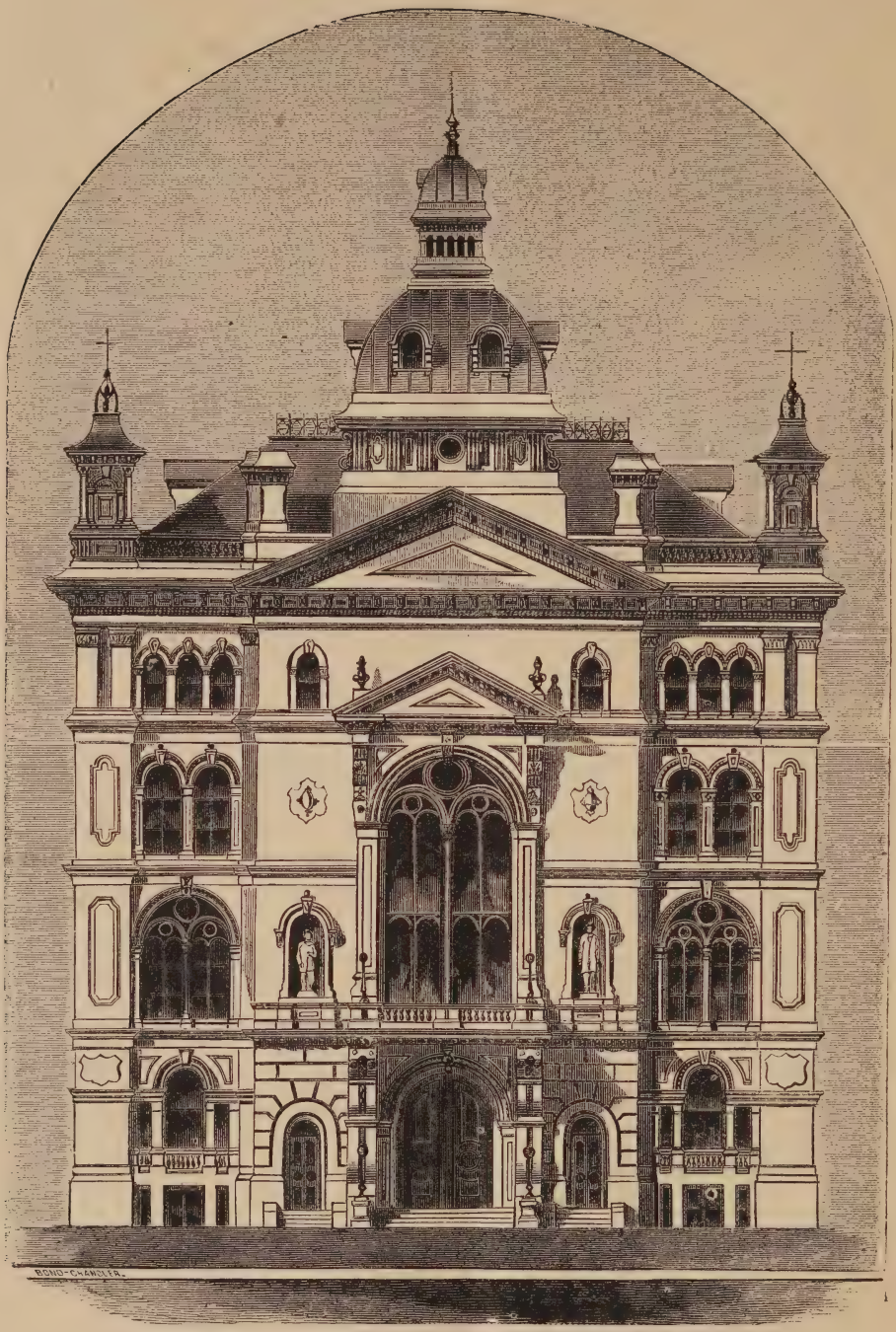
A building of this character should have all its principal offices, at least all wherein court and land records, and other important papers are kept, made FIRE PROOF. The safe keeping of money, or other valuables, should be provided for in burglar-proof vaults or safes set in the fire proof rooms.

This class of buildings should be most substantially constructed, and the subject of ventilation and heating fully considered.

I have given views of two buildings, representing two different styles materially unlike, and each adapted to a certain kind of material, of which they should be built. If good quarries of stone are at hand with which to build, the



COURT HOUSE — G. P. Randall, Architect.



DESIGN FOR CHAMBER OF COMMERCE. — (Rejected.)

G. P. Randall, Architect.

one having a portico and dome, would, perhaps, make the most stately looking edifice; while on the other hand, should brick be the principal material, with stone dressings, the other might be the most appropriate design. Either, however, may be built of stone or brick, if desirable.

BUSINESS BLOCKS,

RAILWAY BUILDINGS,

STORE HOUSES, ETC.

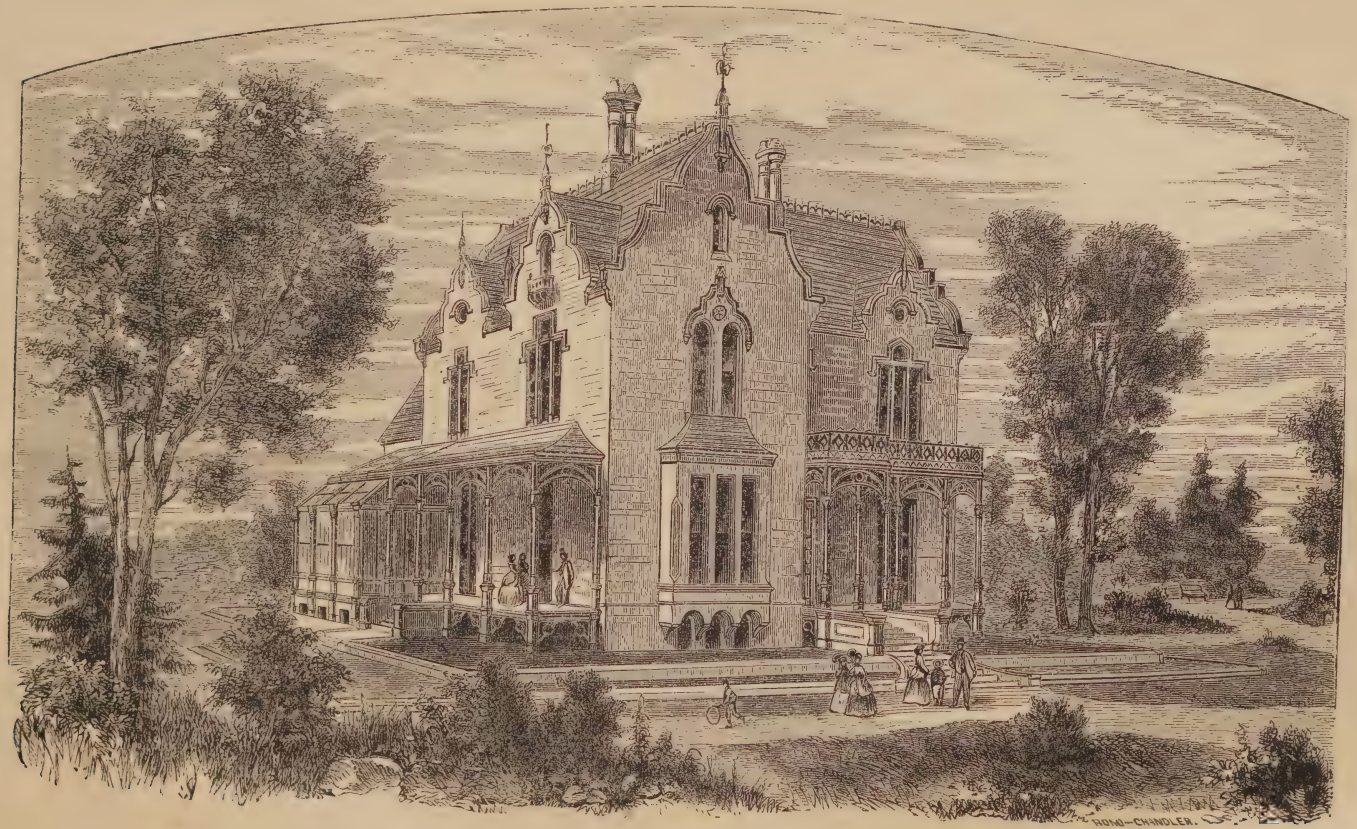
Every necessary attention will be given to the designing of business blocks, such as stores, banking houses, etc. For want of space I have given but one design of a street building, that made for the Chamber of Commerce in this city, but which was rejected, as were some fourteen others, for the one from which the building has been built. The citizens of Chicago are respectfully invited to compare the two designs, and judge of their merits for themselves.

To railroad companies or individuals, who are about to engage in the erection of heavy buildings, requiring the best engineering talent in the construction of foundations, as well as superstructure, permit me to say, that in years past, I have designed and supervised the construction of depots, engine houses, shops, and other buildings, and to some extent, bridges, on several of the principal roads in New England and New York, with the best of success, as my work will show; and now, with the additional advantage of some fifteen or twenty years of practical experience, study,

and observation, together with at least a respectable acquaintance with the details of public and important engineering works of this and other countries, I trust that I may not disappoint the reasonable expectation of my friends who see fit to honor me with their patronage.

DWELLING HOUSES.

There is no class of buildings that require so much time and patience at the hands of an architect, as dwelling houses; and, perhaps for the reason that none deserve so much. In the old style New England farm house, with its spacious kitchen, in which the whole family ate, drank, and sometimes slept; with its large open fire-place and fire, before which turkeys were wont to be roasted; and its spacious oven, which gave forth pork and beans and pumpkin pies, in such abundance; in houses such as these, the skill of the architect, if one was employed, was not very greatly taxed in determining their arrangements; but in the onward march of improvements, if such they be; other and more complicated combinations are required. Then, the kitchen with its ample dimensions, included within itself, not only a kitchen, but laundry, dining and sitting room; so that in fact, it was *the* room of the house. In some of the better class of those ancient homesteads, there was a "square room," (parlor,) but this was seldom used except when the venerated Parson made his parochial visit; or on other extraordinary occasions.



RESIDENCE OF DR. KENNICOTT, COTTAGE GROVE.—(Now Building.)

G. P. Randall, Architect.

But in more modern times, different arrangements are required; and woe be to the architect who neglects the "modern improvements," such, for instance, as bath rooms, laundries, a dozen or more closets, (not exclusively for private devotion,) and other modern appurtenances.

No pains will be spared in designing such buildings, either for city or country, to make them the best of their kind; and as I keep constantly in my employ, several superior assistants,—as good designers and draughtsmen as the country produces,—I think I may safely assure those who wish to build from superior designs, that they will find it to their advantage to give me their orders.

I have given but one illustration of this class of buildings, for want of suitable engravings. This one is the proposed residence of Dr. Kennicott, of this city, and is now building at Cottage Grove, in the South Division.

FOUNDATIONS.

Good foundations, in the construction of a building, are of the utmost importance, and should claim a liberal share of the architect's attention; for if they be defective, however well the superstructure may be built, it is doomed to premature decay.

On the level prairies of this part of our country, we find much of the soil on which we build, to be of a soft, flexible character, not unfrequently of the nature of quicksand, and sometimes of the very worst kind. This is especially the

case in Chicago, and it is for the reason that many of our finest churches and other heavy structures in this city, have suffered badly on account of insufficient foundations, that I venture to offer some suggestions in reference to this important part of a building.

There are a variety of ways by which the above difficulties may be overcome; to some of which I shall make general reference, leaving the details as matter more appropriate to a specification.

It is a popular theory that if the ground be soft, piles should be driven in order to secure stability of construction; and this, to a limited extent, is true, though not necessarily so. Good piles, well driven, or driven until they are thoroughly imbedded in a stratum of hard clay, sand, gravel, or other compact earth, and where they will be continually wet, will make the best of foundation; but even in such case, they have no advantage over concrete, only that if the permanent soil be deep below the surface, or below a superstratum of quicksand or other soft substance, the underlying, or hard soil, may be reached and made to serve the purpose required, without the necessity of excavating the soil above, as would be the case if concrete were used. This is peculiarly the case in and around water, where to lay a foundation of concrete, the expense of a coffer dam would necessarily be incurred. Were it not for this, a bed of concrete would secure quite as good, and sometimes a better bearing on which to rear a superstructure, than could be made with piles. The reason is this, that piles can never, under any circumstances, secure a bearing upon any more area than that which they cover, and if not well driven, will not do even this; while concrete will always do it, without the possibility of failure. I have known a great many disastrous failures in the use of piles for foundations, but seldom or never one with concrete. But a failure in using either, would be the result of their improper use, and what would prove a success in one case, might be a failure in another.

To illustrate,—If you would build a foundation for a heavy structure on a marshy piece of ground, with a depth of soft material entirely beyond that which piles can be driven,—and such places are often found here,—then it follows that piles should not be used. Now if this marshy soil be not too very soft, a *large surface* may be covered over with concrete, and built upon with entire safety; and on the principle that is involved when you lash to your feet a pair of snow-shoes, and walk with impunity upon the snow-surface, into which, you would sink at once without them. But it is not the proper use of either material, that will involve the architect or engineer in difficulty, but rather the improper use of them. Nor does it answer the purpose that we know how to use them; but we must know when, where and how much to use, of one or the other; of both, or neither.

Concrete is, at the present time, almost invariably used by architects in Europe, for the foundations of heavy church towers; and the want of a knowledge of its practical use, and value, for foundations, on the soft, treacherous, yielding soils, underlying this city, has been the means of entailing upon several of our churches; houses for public worship, whose headless leaning towers, if towers they have, and broken dilapidated walls, too plainly tell of insufficient foundations, and premature decay; all of which, could, and should, have been avoided, by a proper use of a material, the ingredients for which, we have at hand, and in great abundance. I can refer the reader to numerous examples, both at home and abroad, of its use under circumstances quite as unfavorable as any that we have to contend with, and where it has been used with entire success.

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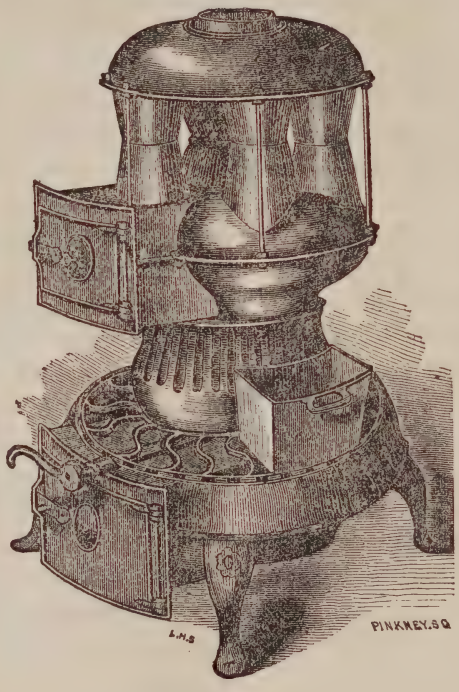

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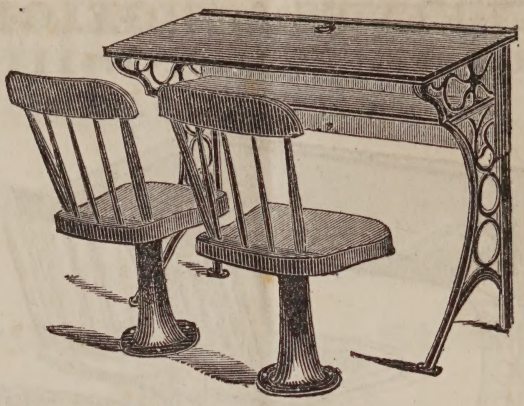

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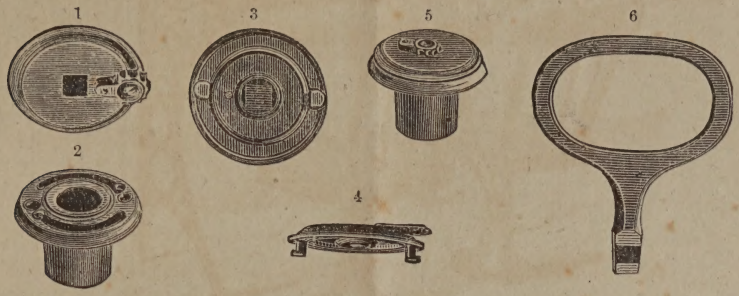

EXPLANATION.—Fig 1 represents a top view of the cover Fig. 2, a top view of the well without the cover Fig. 3, a bottom view of the cover. Fig. 4, an edge view of the cover. Fig. 5, a view of well complete. Fig. 6, a key to screw on and unscrew cover The Ink Well (Fig. 5) is inserted into the desk through a hole bored for the purpose, so that the flange, (which is of considerably larger diameter than the body,) rests upon the surface of the desk, and is secured in place by screws inserted in countersunk holes. The flange of the well has turned down on its outer edge a lip, which alone rests on the desk, leaving a space within, below the interior part of the flange. This space is provided for the purpose of allowing room in which pins or studs projecting downward from the lower side of the cover may freely move. The pins have enlarged ends, or heads, (as seen in Fig. 4, and are first inserted through appertures made large enough to admit them freely in the flange of the well, as represented in cut, (Fig. 2.) From these appertures extend, concentrically in opposite directions, curved slots, just wide enough to allow the necks of the pins to pass freely, (as seen in Fig. 2.) The lower edges of these slots have a slight inclination downward from the appertures, so that as the cover is turned round the heads of the pins become wedged against the inclined surfaces, and draw the cover closely down upon the well on which it is made to fit tightly The cover is fastened by means of a key, (Fig. 6.)

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